CLAIMS

We claim:

1. An improved bacteriophage RNA polymerase enzyme, the improved enzyme being characterized by having a significantly diminished ability to displace RNA that causes reduced synthesis of aberrant products on templates having protruding 3' ends in the non-template strand.

2. The improved enzyme according to claim 1, being further characterized by the markedly decreased addition of a non-templated nucleotide to the 3' end of transcripts during the RNA synthesis process.

3. The improved enzyme according to claim 2, being additionally characterized by the ability, during mRNA synthesis from DNA templates, to increased yields of products on templates that terminate in G:C rich sequences to a level comparable to the yields of products ion DNA templates that terminate in non G:C rich sequences.

4. The improved enzyme according to claim 3, being additionally characterized by having a region of residues present as a disordered loop that does not interact with nucleic acid components in the initiation complex during early stage synthesis.

5. The improved enzyme according to claim 4 wherein said enzyme is bacteriophage T7 RNA polymerase having a deletion of residue number 172 and residue number 173.

6. An improved enzyme according to claim 4 wherein said enzyme is bacteriophage T3 RNA polymerase having a deletion of residue number 173 and residue number 174.

7. An improved enzyme according to claim 4 wherein said enzyme is bacteriophage SP6 RNA polymerase having a deletion of residues 140 through 143.

8. An improved method of synthesizing homogeneous mRNA from DNA templates comprising transcribing under suitable synthesis conditions DNA templates with a modified bacteriophage RNA polymerase enzyme characterized by having a significantly diminished ability to displace RNA that causes reduced synthesis of aberrant products on templates having protruding 3' ends in the non-template strand.

9. An improved method according to claim 8 wherein said enzyme is additionally characterized by having a markedly decreased ability to add non-templated nucleotide to the 3' end of transcripts.

10. An improved method according to claim 9 wherein said enzyme is additionally characterized by having the ability, during mRNA synthesis from DNA templates, to increase yields of products on DNA templates that terminate in G:C rich sequences to a level comparable to the yields of products on DNA templates that terminate in non G:C rich sequences.

11. An improved method according to claim 10 wherein said enzyme is additionally characterized by having a region of residues present as a disordered loop that does not interact with nucleic acid components in the initiation complex during early stage synthesis.

12. The improved method according to claim 11 wherein said enzyme is selected from bacteriophage T7 and T3 RNA polymerase enzymes having deletions in the region of residues 172 to 179 and from bacteriophage SP6 RNA polymerase enzyme having deletions in the region of residues 140 to 145.

13. The improved method according to claim 12 wherein said bacteriophage T7 RNA polymerase enzyme has a deletion of residues 172 and 173.

14. The improved method according to claim 12 wherein said bacteriophage T3 RNA polymerase enzyme has a deletion of residues 173 and 174.

15. The improved method according to claim 12 wherein said bacteriophage SP6 RNA polymerase enzyme has a deletion of residues 140 through 143.